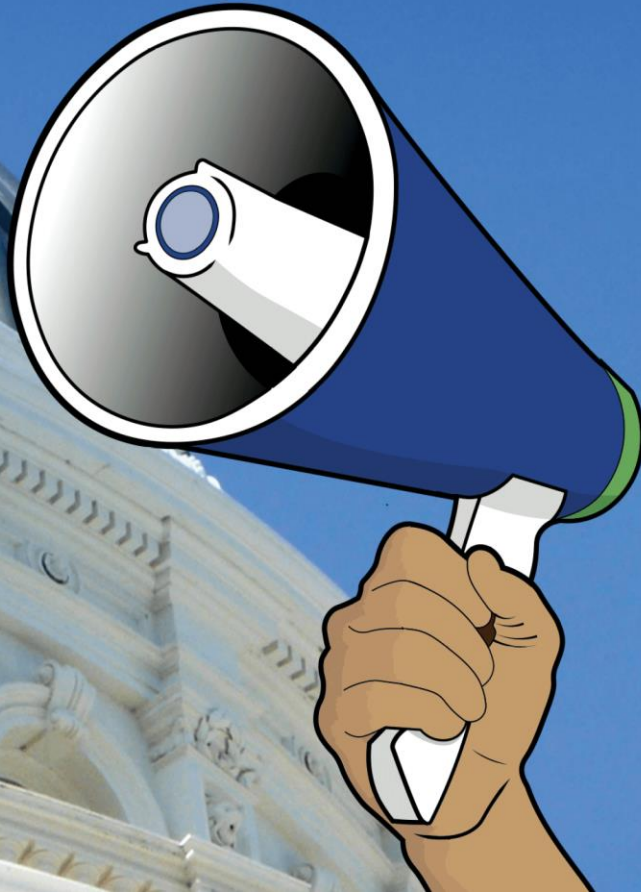


Energy Storage for Electric Reliability

Alex Morris, Executive Director
California Energy Storage Alliance
August 9, 2022



THE DEFINITIVE VOICE FOR **ENERGY STORAGE** IN CALIFORNIA



*CESA creates and builds **energy storage markets** and networks to support the grid in CA. CESA members help drive our advocacy, build relationships with our 100+ members, gain insight, and connect with energy storage policy-makers and buyers such as IOUs, CCAs, Munis, and more.*

CESA  **100+**
MEMBERS

CALIFORNIA ENERGY STORAGE ALLIANCE

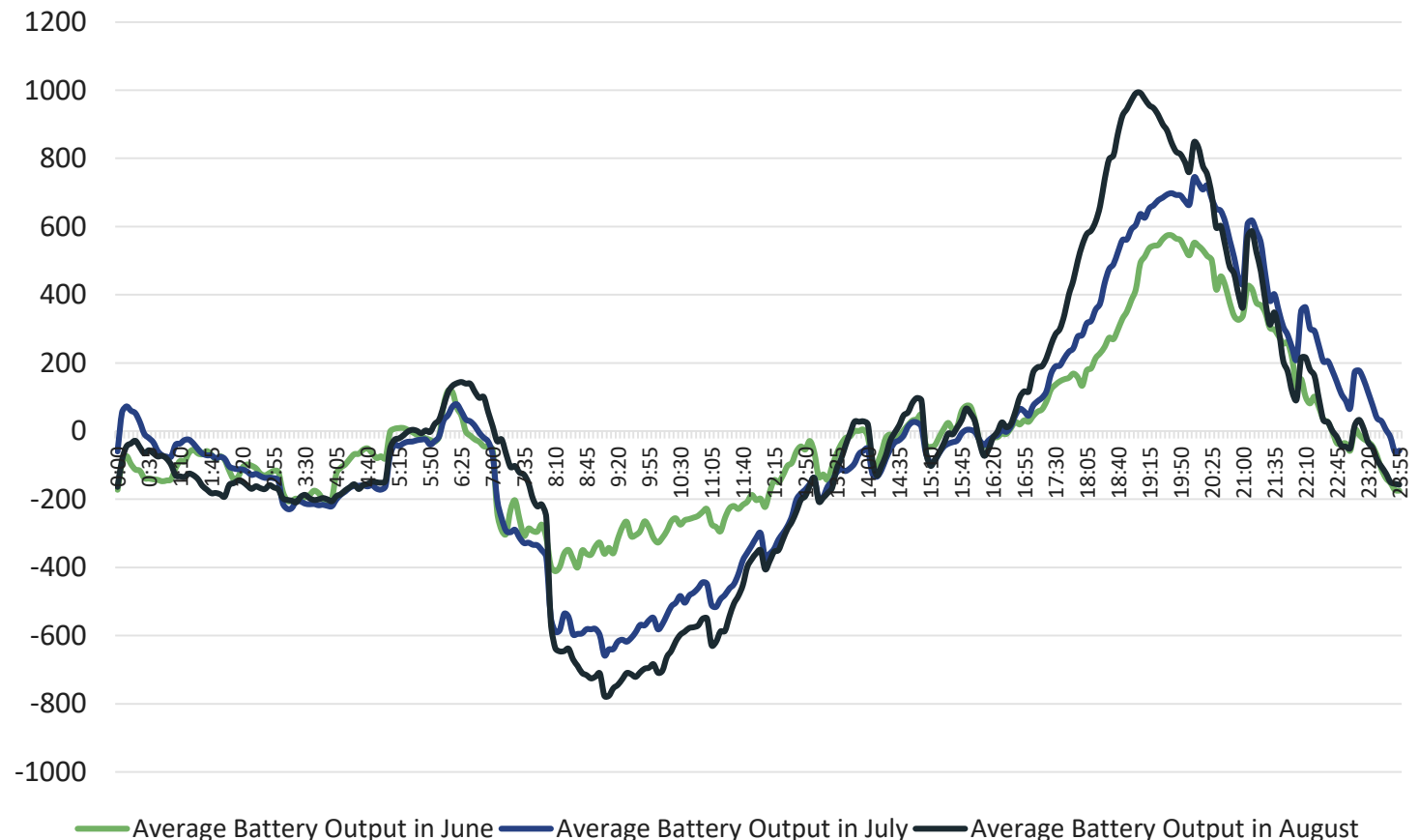
CESA Members



How'd We Do in Summer 2021?

- **Over 4 GW of energy storage are currently integrated to the CAISO system**
- **Less than 2.5 GW of energy storage was online in Summer 2021**
- **“Storage played a crucial role in alleviating stress on the system during tight energy supplies on July 9, 2021” – CAISO¹**

Average 5-Minute Output of Battery Storage in CAISO (June 15 - August 31, 2021)



1. CAISO. “Storage was the compelling story of 2021”, 2022. Available online at: <http://www.caiso.com/about/Pages/Blog/Posts/Storage-was-the-compelling-story-of-2021-according-to-our-newly-published-Annual-Stats.aspx>

Gobs of Storage

California regulators resource plans call for ~ 11 GW of energy storage in the next 4 years.

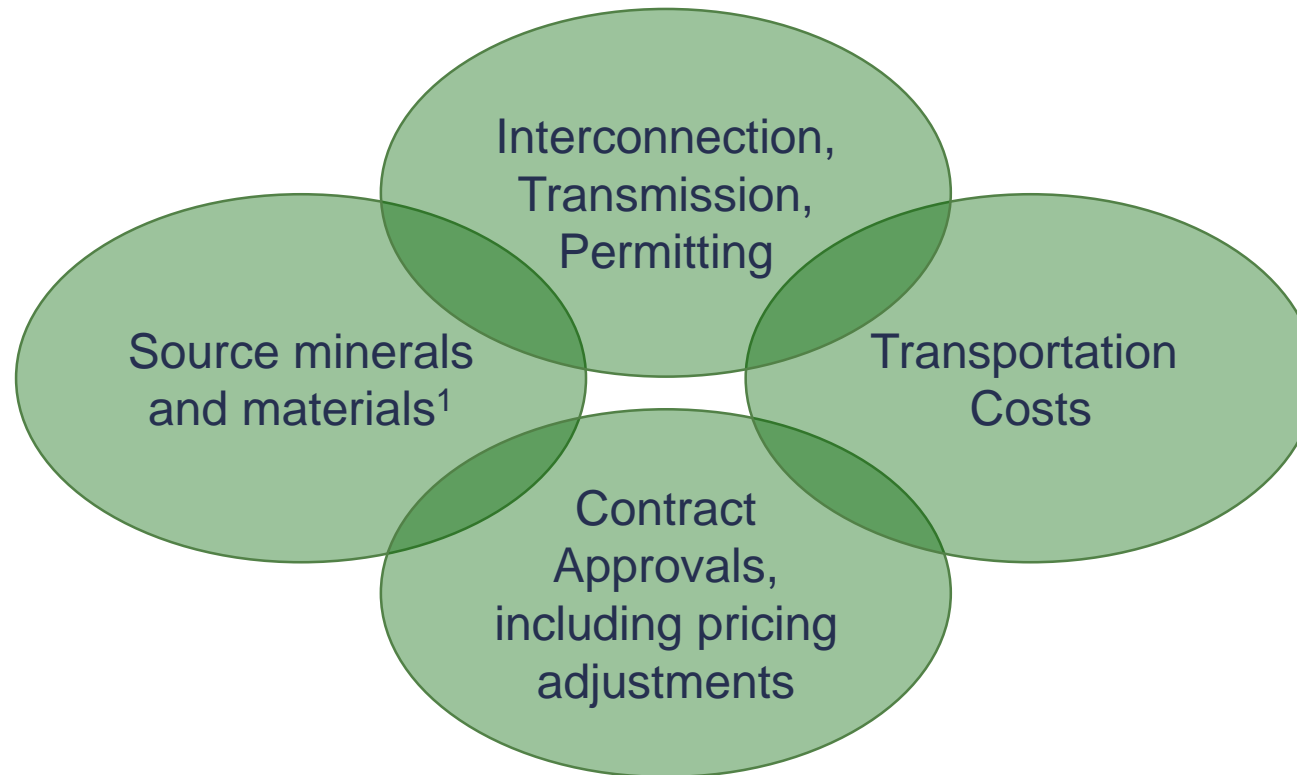
Table 5. New Resource Buildout of 38 MMT Core with 2020 IEPR Demand and High EV Penetration (Cumulative MW)

Resource Type	2022	2023	2024	2025	2026	2028	2030	2032
Gas	-	-	-	-	-	-	-	-
Biomass	34	65	83	107	107	134	134	134
Geothermal	14	114	114	114	184	1,160	1,160	1,160
Wind	1,697	1,719	2,049	3,531	3,531	3,531	3,531	3,531
Wind on New Out-of-State Transmission	-	-	-	-	-	-	1,500	1,500
Offshore Wind	-	-	-	-	120	195	195	1,708
Utility-Scale Solar	3,094	6,549	7,750	11,000	11,000	11,397	14,342	17,506
Battery Storage	2,565	4,604	9,811	11,317	11,317	12,078	12,395	13,571
Pumped (long-duration) Storage	-	-	-	-	196	1,000	1,000	1,000
Shed Demand response	151	151	355	441	441	441	441	441
Total	7,555	13,202	20,161	26,511	26,897	29,937	34,698	40,551

Supply-Chain and Project Execution

Challenges

Addressing near-term challenges are critical for getting storage online before Summer 2023.

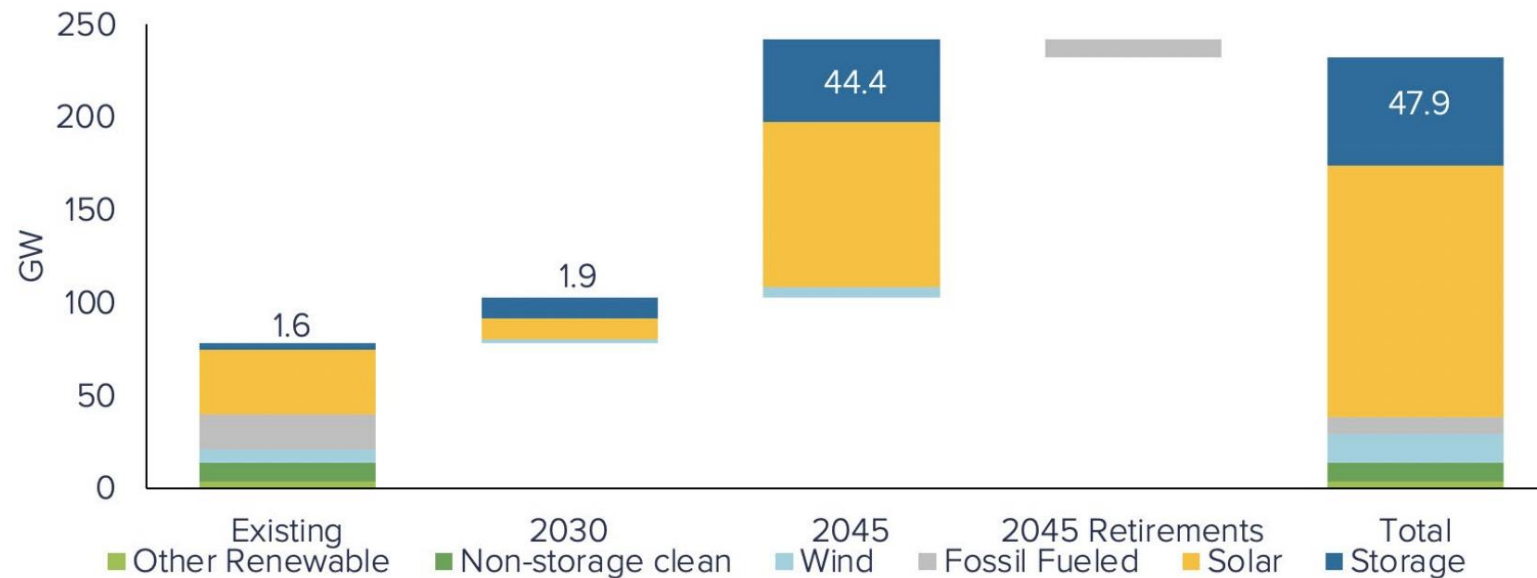


1. Inflationary pressures on other items such as electrolyte, iron phosphate, PVDF, etc.

California Storage Market – The Future

Modeling commissioned by CESA shows that storage needs will ramp up as California advances toward full decarbonization

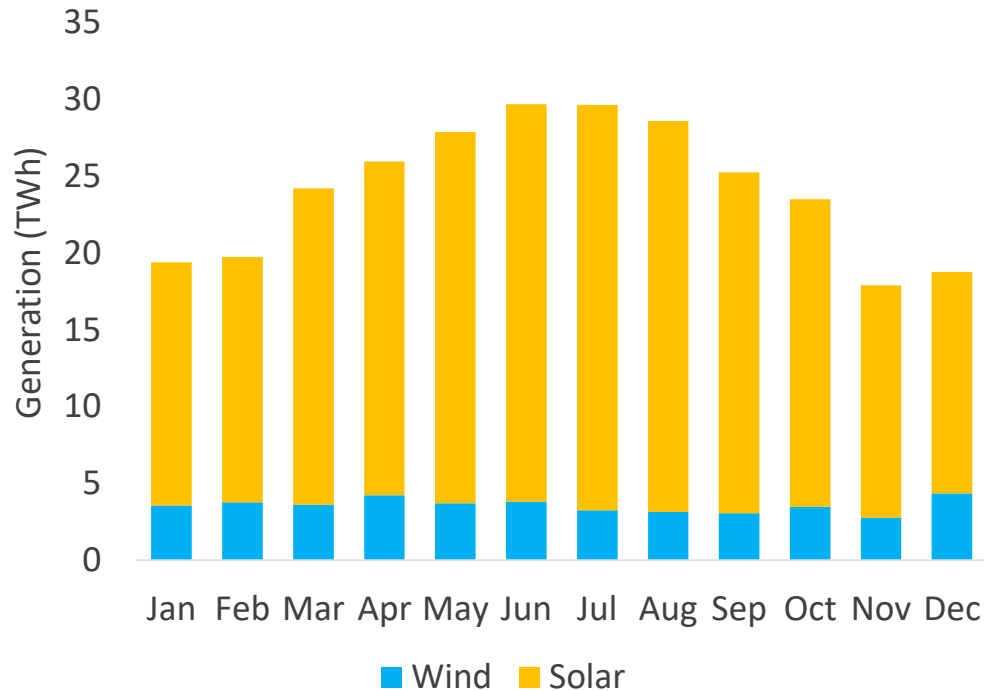
- By 2045, California will need about 50 GW and 350 – 500 GWh.
- Beyond 2030, all new storage additions are *long-duration storage*.



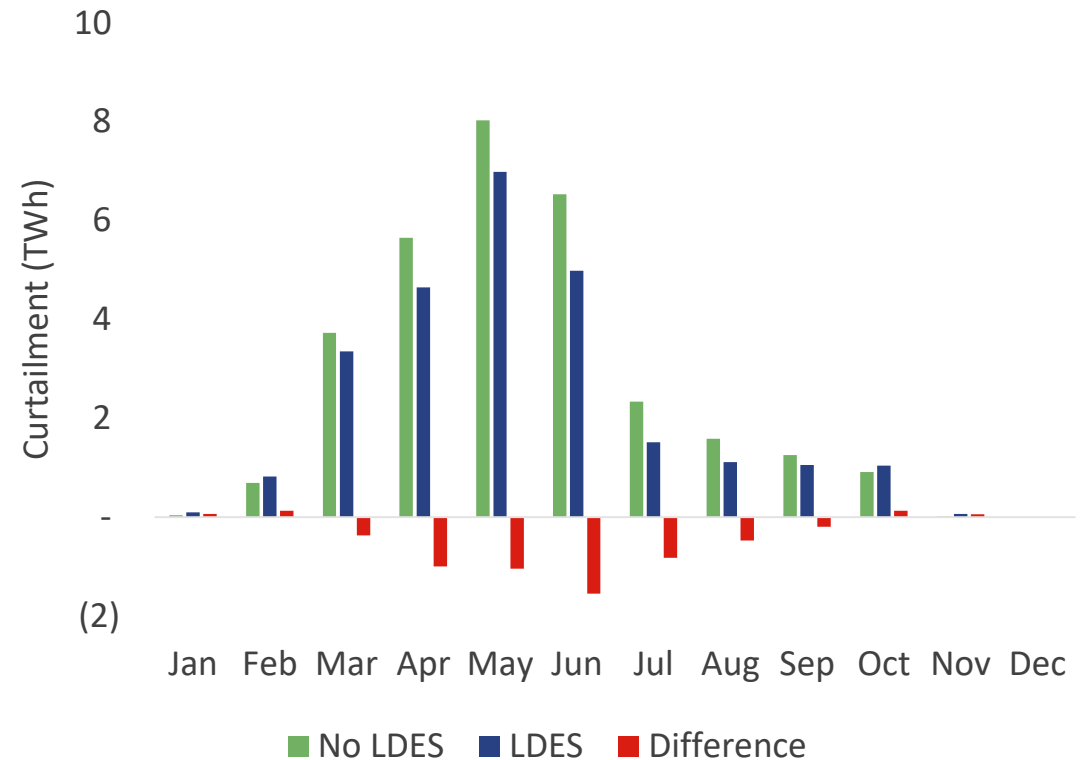
Over the next two and a half decades, resource additions in California are expected to come primarily from storage and solar.

LDES maximizes the use of renewable energy

Monthly Renewable Generation, LDES Case (TWh)



Curtailment (TWh)



Long-duration energy storage reduces curtailment by ~17%

CESAA

The logo consists of the letters 'CESAA' in a large, bold, sans-serif font. Each letter is filled with a close-up photograph of a green leaf with several clear water droplets on its surface. The background of the entire image is a solid blue color with a subtle, faint pattern of overlapping circles.

CALIFORNIA ENERGY STORAGE ALLIANCE